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INDEX NUMBER.

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Members are requested to give notice of any change of address, or failure in the delivery of the Journal. All communications relating to the Journal should be addressed to the Editor.

A. A. BRENEMAN, 97 Water St., New York.

THE CONSTITUTION OF NICKELIFEROUS PYRRHOTITE.

By Dr. S. H. Emmens.

It is the custom of mineralogists to speak of many mineral varieties as formed by one metal "replacing" another to a greater or less extent in certain chemical combinations. This is, I think I may say, the invariable account given in the text books respecting nickeliferous pyrrhotite, a mineral described as consisting of an iron sulphide in which "part of the iron is replaced by nickel." The object of the present paper is to enquire whether the account in question is a correct representation of the facts of the case, or whether the constitution of nickeliferous pyrrhotite differs from the description given in the text books.

The general formula of pyrrhotite is $Fe_n S_{n+1}$. This is sometimes written n (Fe S). $Fe S_2$ or n (Fe S). Fe_2S_3; though probably, for reasons analogous to those recently set forth, (Journal of Analytical and Applied Chemistry, Vol. VI., No. 10, October, 1892), the more correct view is to regard the typical compound, Fe_3S_4 as being a homogeneous body, and not as being composed of a mixture of sulphides. This question, however, is comparatively unimportant in the present discussion; as, whatever may be the precise arrangement of the molecules, their number will not be changed, and pyrrhotite will still be defined as an iron sulphide composed of n molecules of Fe and $n+1$ molecules of S. And, on the "replacement" theory, nickeliferous pyrrhotite will be a sulphide composed of x molecules of Ni, $n-x$ molecules of Fe and $n+1$ molecules of S. Let us test this numerical theory by the actual results of analysis.

At p. 74 of the 6th edition of Dana's *Mineralogy* is a table of

analyses of various specimens of pyrrhotite. From this I will select the following for discussion, namely :

		S.	Fe.	Ni.
No. 14.	Brewster, N. Y.	37.98	61.84	0.25=100.07
" 15.	Putnam Co., N. Y.	39.28	60.03	0.78=100.09
" 15a.	" "	38.99	60.04	1.02=100.05
" 15b.	" "	39.85	58.73	1.53=100.11
" 20.	Frigido	39.65	58.18	2.17=100.
" 18.	Hilsen	40.27	56.57	3.16=100.
" 17,	Sudbury	38.91	56.39	4.66= 99.96
" 19.	Gap Mine, Pa.	38.59	55.82	5.59=100.

Now it is obvious that any replacement of iron by nickel must take place by whole molecules weighing respectively 58.6 for Ni and 55.9 for Fe. Hence for every Ni molecule in mineral No. 14 of the above list there must be $\frac{58.6}{.25} \times \frac{61.84}{55.9} = 258.9$ molecules of Fe; and, in like manner, there must also be $\frac{58.6}{.25} \times \frac{37.98}{32} = 278.2$ molecules of S; or, in view of the analytical total being a little in excess of 100, we may regard the mineral as consisting of Ni Fe_{259} S_{278} instead of Ni Fe_{259} S_{261}, as called for by the pyrrhotite theory.

Similar calculations in the other cases give the following results :

No. 15	Ni	Fe 80.68	S 92.22	showing an	excess of	S 9.54
" 15a	Ni	Fe 61.71	S 70.00	"	"	S 6.29
" 15b	Ni	Fe 40.24	S 46.62	"	"	S 4.38
" 20	Ni	Fe 28.11	S 33.46	"	"	S 3.35
" 18	Ni	Fe 18.77	S 23.34	"	"	S 2.57
" 17	Ni	Fe 12.685	S 15.29	"	"	S 0.605
" 19	Ni	Fe 10.468	S 12.642	"	"	S 0.174

In none of these minerals does the formula $(Fe\ Ni)_n\ S_{n+1}$ hold good; and we therefore have reasonable ground for declaring that the constitution of nickeliferous pyrrhotite is *not* represented by this time-honored but somewhat superficial generalization.

It will be noticed that the excess of sulphur bears some relation to the percentage of nickel; the lower the nickel contents the greater being the surplus of sulphur, and *vice versa*. This necessarily follows from the great size of the compound molecule when the percentage of nickel is small. If, however, we investigate the proportion borne by the sulphur to the total metal, we shall find a tendency to constancy rather than to variation, as is shown in the following Table:

Per Centage of Nickel.	Proportion of S Molecules in Excess of $n+1$ to		
	Ni Molecules.	Fe Molecules.	Ni+Fe Molecules.
0.25	17.3	.0667	.0666
0.78	9.54	.1182	.1168
1.02	6.29	.1019	.1003
1.53	4.38	.1088	.1062
2.17	3.35	.1192	.1152
3.16	2.57	.1369	.1300
4.66	0.605	.0477	.04421
5.59	0.174	.0166	.01517

This suggests that the constitution of nickeliferous pyrrhotite is polymeric; an inference which is also supported by the fact that Nos. 17 and 19, containing the high nickel percentages of 4.66 and 5.59, show less than 1 complete molecule of sulphur in excess, and therefore require a multiplication of their several figures. Taken as a whole, however, the results of analysis are opposed to any assumption of homogeneity of structure.

Coming now to physical investigation, we are at once met by a feature that is conclusive against the hypotheses of "replacement" and homogeneity. I allude to the fact that nickeliferous pyrrhotite may be divided into two portions, one of which is magnetic while the other is non-magnetic. This fact has long been known to chemists. In 1879 Habermehl effected a separation of

the magnetic from the non-magnetic portions of pyrrhotite for the purpose of obtaining a pure mineral for analysis. In 1890 T. J. McTighe applied magnetic separation in the treatment of the nickeliferous pyrrhotite of Canada; and in July of this year T. A. Edison applied for a U. S. Patent, in respect of virtually the same invention, and filed a specification containing the following statement:

"I have discovered that where magnetic pyrites, called "pyrrhotite" is nickeliferous, as it usually is to a more or less extent, the nickel is not distributed generally throughout the whole body of the pyrrhotite, but certain crystals are pure pyrrhotite or magnetic pyrites, while other crystals have some of the iron replaced by nickel and sometimes by cobalt, and that the crystals containing the nickel or cobalt are considerably less magnetic than the pure pyrrhotite."

Any statement made by Mr. Edison is deserving of respectful attention; but I believe that gentleman has frequently disclaimed anything beyond a rudimentary knowledge of chemistry and is therefore presumably open to correction in matters belonging to that department of science. Be this, however, as it may, I am safe in saying that pyrrhotite is rarely found in a crystalline form, and that crystals of nickeliferous pyrrhotite are as yet unrecorded as having been observed. Mr. Edison's mention of "crystals" is probably only a loose way of describing the minute fragments, particles or grains into which the massive pyrrhotite is divided by comminution.

Again, Mr. Edison speaks of the strongly magnetic particles as being "pure pyrrhotite," meaning thereby a non-nickeliferous iron sulphide of the general form $Fe_n S_{n+1}$. My own observations do not confirm the statement that nickeliferous pyrrhotite can be magnetically separated into nickeliferous and non-nickeliferous portions. A separation into two very distinct minerals or mineral mixtures is possible, and these contain very distinct percentages of nickel; but both are nickeliferous. The following results obtained by Mr. C. T. Mixer at the laboratory of the Emmens Metal Company will illustrate this.

Two samples of nickeliferous pyrrhotite were taken, one from

the Gap mine, Lancaster Co., Pa., and the other from a mine near Sudbury, Ontario. These were very finely powdered and then each sample was carefully separated by means of a magnet into three grades, namely, "magnetic," "feebly magnetic" and "non-magnetic." The "magnetic" and "non-magnetic" grades were then analyzed and resulted as follows, after deduction of gangue:

	Ni.	Fe.	S.
Gap *magnetic*....	0.35 %	59.97 %	39.68 %
" non-mag....	15.59 "	43.00 "	41.41 "
Sudbury magnetic	1.30 "	58.27 "	40.43 "
" non-mag.	23.16 "	33.92 "	42.92 "

Treating these figures in the same way as those of the analyses recorded by Dana, we have:

1. Molecular Constitution.

Gap mag.....	Ni	Fe	S	showing an excess of S
		46.99	56.95	7.96
" non-mag....	Ni	Fe	S	" a deficiency of S
		1.535	3.394	0.141
Sudbury mag	Ni	Fe	S	" an excess of S
		179.6	207.6	26
" non-mag-	Ni	Fe	S	" a deficiency of S
		2.891	4.864	0.927

2. Proportion of Excess S to Metal.

Percentage of Nickel.	Proportion of S molecules in excess of $n+1$ to Ni molecules.	Fe molecules.	Ni + Fe molecules.
0.35	26.00	.1448	.1440
1.30	7.96	.1694	.1659
15.59	Slight deficiency of S.		
23.16	" " "		

A comparison of the results here obtained with those from Dana shows conclusively that the magnetic minerals are of the pyrrhotite type, but that the non-magnetic concentrates are of a quite dissimilar constitution; and as the latter are much higher in nickel than the former it is also clear that the nickel is *not* present as an element replacing iron in pyrrhotite. It is also apparent that the minerals Nos. 17 and 19 of Dana are mixtures of the magnetic and non-magnetic minerals found in the Gap and Sudbury samples examined by Mr. Mixer.

Much additional investigation is needed to determine the true constitution of pyrrhotite and its allied nickel compound. It may be that experiments as to the solvent action of molten ferrous sulphide upon iron disulphide and nickel sulphide will throw the needed light upon the subject. Many geologists are of opinion that the massive pyrrhotites of Canada and other places are the cooled remains of a molten mass; and every parcel of matter produced from a smelter is an object lesson respecting the varying mixtures that are possible under such conditions. Provisionally, therefore, we may regard the constitution of the minerals under discussion as represented by the following formulæ:

Crystalline pyrrhotite	$n\ (Fe_3 S_4)$
Amorphous do	$n\ (FeS).\ x\ (FeS_2)$
Nickeliferous do	$n\ (FeS).\ x\ (FeS_2).\ y\ (NiS)$

In conclusion it may be well to say a word as to the practical problem of the magnetic concentration of nickeliferous pyrrhotite. The two samples above referred to as examined by Mr. Mixer gave the following results:

1. Division of the total sample:

	Gap.	Sudbury.
Magnetic portion	58.66 per cent.	92.95 per cent.
Feebly magnetic portion	6.67 "	2.09 "
Non- " "	34.67 "	4.96 "

2. Division of the total nickel contents:

	Gap.	Sudbury.
Magnetic portion	16.25 per cent.	58.01 per cent.
Feebly magnetic portion	19.96 "	7.60 "
Non- " "	63.79 "	34.39 "

3. Total gangue in sample:

Gap	41.28 per cent.
Sudbury	10.7 "

4. Division of the total gangue:

	Gap.	Sudbury.
Magnetic portion	25.85 per cent.	75.51 per cent.
Feebly magnetic portion	7.12 "	9.07 "
Non- " "	67.03 "	15.42 "

5. Percentages of gangue in the portions:

	Gap.	Sudbury.
Magnetic portion.....	18.20 per cent.	8.70 per cent.
Feebly magnetic portion..	44.00 "	46.60 "
Non- " " ..	79.80 "	33.20 "

The practical inferences from these figures are as follows:

1. Magnetic separation will give a rich nickel concentrate.
2. An ore with considerable gangue will yield more of its nickel as "concentrate" than will be the case with cleaner ore.
3. The concentrate from clean ore will be of a higher grade than that from ore carrying much gangue.
4. The nickeliferous portion of the mineral is attached to the gangue more firmly than is the non-nickeliferous portion.
5. The nickel is *possibly an essential constituent of the gangue instead of being a constituent of the pyrrhotite.*

This last inference is so opposed to the generally received teachings that I have instituted a fresh series of investigations with a view to determine its correctness or the reverse. The results shall in due course be communicated to the Society; and, in the meantime, all I can say is that at present they seem to favor the supposition of the gangue being nickeliferous.

ON AMERICAN LITHOGRAPHIC STONES.

By Dr. C. W. Volney.

I regret that, in preparing this report, I cannot give an exhaustive reference to existing literature on this subject; what I have been enabled to consult did not give me the desired information, and in order to obtain material for comparison I analyzed some mineral from Germany. This was of undoubtedly good quality. Lithographic limestone is the product of different geological formations. If it is true that any limestone of fine, even grain can be used in the lithographer's art, it is equally true that such material seems to be very difficult to find, although we have immense tracts of calcareous deposits to select from. Of the various samples of limestone which have been tested for lithographing purposes, many show in outward appearance a very close resemblance in grain and structure to varieties known to be good, but prove nevertheless worthless. To ascertain the real cause a physical examination seems insufficient, and on the other hand the chemical examination, so far as has come under my notice, does not show sufficient grounds for the established distinction. I quote here the analytical results given in the "Report of Mineral Resources of the United States, 1893," as follows:

Stone from Missouri.

Silicates	31.2
$CaCO_3$	817.7
$MgCO_3$	151.0
Fe_2O_3	0.1
	10000.

Stone from Bavaria.

Silicates	44.5
$CaCO_3$	814.7
$MgCO_3$	138.3
Fe_2O_3	2.5
	1000.0

Nothing here would indicate any practical difference, and as it is reasonably sure that in physical properties, fineness of grain, etc., these stones resembled each other, a distinction for practical use could not be deduced from these analyses. To obtain, however, material for comparison, I procured German stones of undoubted good qualities as lithographic stone, and selected two, one of dark blue and one of light yellow color, with these results:

Dark blue stone from Solenhofen:

Spec. gravity at 15.5°=2.952.

Insoluble silicate	2.0000
Organic matter	0.7200
$CaCO_3$	90.9341
$MgCO_3$	3.5710
Soluble silica	0.5200
Al_2O_3	0.5840
Fe_2O_3	0.2360
FeO	0.1300
Water	0.4000
	99.951

Light yellow stone from Solenhofen.

Spec. gravity at 15.5°=2.8388.

Insoluble silicate	1.8930
Organic matter	0.1320
Soluble silica	0.0200
$CaCO_3$	89.5390
$MgCO_3$	4.3801
Al_2O_3	0.1010
Fe_2O_3	0.3210
FeO	0.0030
Water	1.379
	97.7681

Light gray stone from Kentucky.

Spec. gravity at 15.5°=2.99331.

Insoluble silicate	11.500
Organic matter	0.400
$CaCO_3$	73.241
$MgCO_3$	12.431
Al_2O_3, Soluble silica, Fe_2O_3	1.141
Water	0.935
	99.648

Blue stone from Iowa.

Spec. gravity at 15.5°=2.8173.

Insoluble silicate	6.97500
Organic matter	3.30000
$CaGC_3$	82.20051
Fe_2O_3, Al_2O_3, Soluble silica	1.07631
$MgCO_3$	4.32703
Water	0.24001
	98.11886

Light gray stone from Missouri.

Spec. gravity at 15.5°=2.7558.

Insoluble silicate	4.300
Organic matter	1.830
$CaCO_3$	77.031
$MgCO_3$	14.271
Fe_2O_3, Al_2O_3, SiO_2	2.143
Water	0.341
	99.916

Light blue gray stone from Canada.

Spec. gravity at 15.5°=2.8388

Insoluble silicate	3.71200
Organic matter	0.40910
$CaCO_3$	89.98900
$MgCO_3$	2.78932
Al_2O_3 and SiO_2	0.73101
Fe_2O_3	0.15302
FeO	0.10431
Water	1.25000
	99.13776

Dark blue stone from Canada.

Spec. gravity at 15.5°=2.89104

Insoluble silicate	3.6000
Organic matter	1.2900
$CaCO_3$	88.0341
$MgCO_3$	2.5000
Soluble silica	0.4900
Al_2O_3	0.5770
Fe_2O_3	0.3590
FeO	0.0410
Water	1.3601
	99.2512

I observed that in a number of stones analyzed, in drying at 100°, a certain amount of organic matter volatilizes and escapes with the moisture contained in the stones. In most cases, therefore, the quantity of water will be found too high at the expense of organic matter. The latter contains nitrogen and traces of iodine, and is evidently the remnant of cretaceous fossils, and the silica may also originate from these fossils. It is certain that these organic remains cause the difference in the color, in fact they form the coloring matter of these limestones, and its presence does not seem to interfere, by any means, with the usefulness of the stone in lithographic art. It might be even presumed that the presence

of this partially destroyed animal matter may have had some influence on the peculiar precipitation, and, under great pressure, on the fine and even formation of these peculiar strata. The material collected by me and the work done so far does not justify a final conclusion ; but it is probably sufficiently strong to indicate it, and may give an idea for practical tests ; in all other respects, with the exception of some stones containing too much siliceous matter, the composition varies but little, and the differences are not pronounced enough to impair the quality of the stone for lithographic purposes.

Whatever the influence may have been of this organic matter on the precipitation of calcium carbonate—holding this and other inorganic substances in suspension, retarding quick precipitation and thereby assisting in the formation of even grained and dense strata under subsequent pressure, it may be conceded that lithographic stone was formed during or after the destruction of a large and peculiar fauna, like the jurassic and silurian limestone periods ; and if further analytical work should confirm what my present investigation seems to indicate, that this peculiar coloring matter is an essential feature of good lithographic stone, an identification of the proper material in the original deposits would thereby be greatly facilitated.

New York, December 17th, 1892.

Abstracts of American Patents Relating to Chemistry.

(From the U. S. Patent Office Gazette.)

(Issued November 1, 1892.)

485,177.—Wall plaster. Charles L. Denison, Corning, N. Y.

Composition consisting of lime, cottonseed meal, plaster of paris, borax and cream of tartar.

485,185.—Apparatus for carbureting air or gas. Edward J. Fust and Willis C. Squire, Philadelphia, Pa.

485,199.—Method of drying and burning brick. John C. Kinzel, Knoxville, Tenn.

485,214.—Adding machine. Charles A. Oakes, New York, N. Y.

485,217.—Refrigerating apparatus. Charles H. Parshall, Detroit, Mich.

485,244.—Method of and apparatus for charging soda water. John H. Vinton, Boston, Mass.

485,246.—Machine for disintegrating jute, etc. Philip H. Wait, Sandy Hill, N. Y.

485,248.—Treatment of sparkling wine. Armand Walfard, Rheims, France.

485,257.—Oil spraying device. Charles R. Collins, Philadelphia, Pa.

485,272.—Machine for opening and cleaning cotton. Wallace P. Groom, Brooklyn, N. Y.

485,280.—Amalgam for dentists' use. Gustav Jüterbock, Berlin, Germany.

A gold covered alloy prepared by rolling an alloy of silver and tin in thin sheets and pouring on the same a galvanic deposit of pure gold.

485,288.—Method of and apparatus for carbureting gas. Hiram S. Maxim, London, England.

485,315.—Vacuum evaporating apparatus. Homer T. Yaryan, Toledo, Ohio.

485,319.—Galvanic battery. Walter A. Crowdus, Memphis, Tenn.

485,321.—Machine for securing incandescent bodies for gas burners in their holders. Otto B. Fahnenhjelm, Stockholm, Sweden, and Carl Dellwick, Rogers Park, Ill.

485,322.—Machine for manufacturing lamellæ or needles for incandescent gas burners. Otto B. Fahnenhjelm, Stockholm, Sweden, and Carl Dellwick, Rogers Park, Ill.

485,323.—Brick machine. Thomas C. Fawcett, Leeds, England.

485,329.—Process of making imitation long heron feathers. Simon Lewinsohn, Berlin, Germany.

485,340.—Glass furnace. Richard M. Atwater, Pittsburg, Pa.

485,341.—Process of and apparatus for purifying and maturing liquors or distilled spirits. Ira B. Cushing, Brookline, Mass.

485,343.—Method of and apparatus for electro-depositing of metals. Charles R. Fletcher, Boston, Mass.

485,355.—Apparatus for drying and germinating malt. Johann H. E. Rathmann, Buffalo, N. Y.

485,357.—Oxidizing apparatus. Ethelbert A. Rusden, Providence, R. I.

485,362.—Method of impregnating beer, etc., with carbonic acid gas and apparatus therefor. Otto Zwietusch, Milwaukee, Wis.

485,386.—Machine for manufacturing and dispensing aerated water. John P. Jackson, Liverpool, England.

485,387.—Apparatus for cleaning tin and terne plates. Thomas Jenkins, Llanelly, England.

485,388.—Heating apparatus. Ernst P. H. Kelting, Oldeslohe, Germany.

485,390.—Furnace for melting glass. John Kitson, St. Louis, Mo.

485,391.—Gas producer. William A. Koneman, Chicago, Ill.

485,392.—Method of and apparatus for recarbonizing metals. William A. Koneman, Chicago, Ill.

485,395.—Anti-filling valve for bottles. Prentice B. Moore, North Wilbraham, Mass.

485,408.—Manufacture of parchmentized fiber tubes. Robert T. Frist, Wilmington, Del.

485,423.—Alloy. Henry G. O'Neill, Louisville, Ky.

An alloy having qualities of anti-fusion and great electrical resistance. Composed of copper, tin, silicon, nickel and zinc.

485,424.—Electrical heater. Henry G. O'Neill, Louisville, Ky.

485,428.—Concrete mixing machine. Ernest L. Ransome, Oakland, Cal.

485,437.
485,438.
485,439.
} Water meters. John Thompson, Brooklyn, N. Y.

485,453.—Chemical reagent for use in the manufacture of alloys. Sherwood E. Cheeseman, Kansas City, Mo.

Consists of "an alkaline liquid and an arsenite."

485,455.—Slating compound. John B. Coles, Bayonne, N. J.

Consists of "soluble glass, alumina water and pearlash."

485,461.—Process of obtaining alumina and acetic acid. Frederick P. Dewey, Washington, D. C.

485,475.—Centrifugal ore separator. Orrin B. Peck, Chicago, Ill.

485,488.—Grain scourer. William A. Cockrell, Mount Perry, Ohio.

485,501.—Ore feeder. Ernest A. Langford, Grass Valley, Cal.

485,517.—Rock crushing machine. Giles W. Weller, Baker City, Ore.

485,525.—Grain scourer. Herman A. Barnard, Moline, Ill.

485,526.—Carburetor. Daniel Best, San Leandro, Cal.

485,534.—Paper calendaring machine. Peter Dillon, Lawrence, Mass.

485,549.—Brick press. Joseph J. Kulage, St. Louis, Mo.

485,551.—Filter. Thomas T. Luscombe, Chicago, Ill.

485,570.—Feed water heater for steam boilers. Charles C. Worthington, Irvington, N. Y.

485,574.—Enamel for metal articles. Hubert Claus, Thale, Germany.

485,575.—Paper making machine. Linus P. Clauson, Hamilton, Ohio.

485,578.—Pressure regulator for compressed air machines. Ernest C. Fasoldt, Albany, N. Y.

485,594.—Burner for burning gaseous fuel. Henry Adler, Allegheny, Pa.

(Issued November 8, 1892.)

485,606.—Methods of producing stencils. William H. Bell, San Francisco, Cal.

Ink impressions are arranged between an alum soaked sheet of paper and a gelatine plate; pressure is then applied, which causes the alum to penetrate the gelatine and harden that part of the gelatine not covered by the ink. After removal of the paper the plate is washed, whereby the gelatine beneath the ink is removed and the stencil produced.

485,615.—Manufacture of carbon filaments. Thomas A. Edison, Llewellyn Park, N. J.

Filaments of carbonizable material are suspended in a close chamber out of contact therewith, and, while kept straight by means of weights, the filaments are carbonized by application of suitable heat.

485,616.—Incandescent lamp filament. Thomas A. Edison, Llewellyn Park, N. J.

485,617.—Manufacture of carbon filaments. Thomas A. Edison, Llewellyn Park, N. J.

Prepared from suitable hydrocarbons after driving off the volatile constituents. Carbonized "asphaltine."

482,618.—Apparatus for and process of refining copper by electricity. Franklin Farrer, Ansonia, Conn.

485,624.—Current wheel. Henry C. Gardner, Nashville, Tenn.

485,634.—Apparatus for extracting sulphur. Léon Labois, Paris, France.

485,636.—Clay drying and sifting apparatus. Ezekiel C. Little, St. Louis, Mo.

485,660.—Process of and apparatus for washing and drying phosphate rocks. Rufus S. Rose, Kissimmee, Fla.

485,665.—Process of and apparatus for aerating liquids. Carl H. Schultz, New York, N. Y.

485,688.—Composition of matter for journal bearings. Abraham G. Haley, Gardner, Me.

A composition consisting of "graphite, metallic pigment, fiber and a cementing of binding substance."

485,691.—Method of and apparatus for lining pipes with lead. George W. Harrington, Wakefield, Mass.

485,695.—Apparatus for washing fabrics. Joseph Hanorth, Church, England.

485,714.—Apparatus for raising and forcing water or other liquids. Isaac Shone and Edwin Ault, London, England.

485,730.—Process of treating oxidized or corroded lead. Richard W. F. Abbé, Brooklyn, N. Y.

485,734.—Machine for testing flax or other fibre-yielding plants. Eugene Borse, St. Paul Park, Minn.

485,759.—Intermittent siphon. Rogers Field, London, Eng.

485,762.—Furnace. John H. Johnson and James Moran, Orange, Tex.

485,784. } Processes for casting armor. George H. Chase and Henry L.
485,785. } Gantt, Philadelphia, Pa.

485,788.—Filtering tube. Moritz Epstein, Berlin, Germany.

485,796.—Apparatus for superheating vapors and gases. Moritz Honigmann, Grevenberg, Germany.

485,797.—Screen for metallic fumes. Malvern W. Iles, Denver, Col.

485,805.—Ice forming and preserving room. James M. Rosse, Nyack, N. Y.

485,808.—Paper pulp digester. Charles Curtis, Newton, Mass., and Nathaniel M. Jones, Bangor, Me.

485,809. } Ditto.
485,810. }

485,820.—Means for burning solid carbonaceous fuels. William McClave, Scranton, Pa.

485,822.—Dough kneader. Edwin Prescott, Arlington, Mass.

485,826.—Voltmeter. Eugene R. Carichoff, Richmond, Ky.

485,827.—Lighting and heating apparatus. Daniel W. Clegg, Stapleton, N. Y.

485,837.—Apparatus for pressing and disintegrating fibrous material. John H. Brown, New York, N. Y.

485,840.—Method of bricking fine iron ores. Thomas A. Edison, Llewellyn Park, N. J.

485,841.—Method of magnetically separating ores. Thomas A. Edison, Llewellyn Park, N. J.

Process of separating magnetic oxide of iron from magnetic pyrites where both occur in the same ore, by subjecting the crushed ore to a magnetic current of such strength that the oxide of iron particles only will be acted upon.

485,842.—Method of magnetic ore separation. Thomas A. Edison, Llewellyn Park, N. J.

For separating nickeliferous from non-nickeliferous pyrrhotite by process similar to the above.

485,864.—Ore pulverizer. Ryerson D. Gates, Ridgeland, Del.

485,877.—Apparatus for making gas. Alonzo Noteman, Toledo, Ohio.

485,903.—Fiber preparing machine. John L. Acosta, Vera Cruz, Mex.

485,904.—Method of manufacturing or burning coke. James A. Anderson, Highland Park, Ill.

485,906.—Process of and machine for soldering. Charles M. Brown, Chicago, Ill.

485,907.—Process of and machine for soldering. Charles M. Brown, Chicago, Ill.

485,910.—Gas burner. Cyrus S. Dean, Fort Erie, Canada.

485,911.—Drier. Ellsworth De Lany, Syracuse, and James Dooley, Camillus, N. Y.

485,915.—Method of separating grain and dust or stive from air laden therewith. Frederick E. Duckham, London, England.

485,917.—Process of treating clay and products thereof. Alexander D. Elbers, Hoboken, N. J.

485,919.—Manufacture of mandrils for electrolytic deposit of tubes. Francis E. Elmore, Leeds, England.

485,921.—Paper carpet. Morris G. Faulkner, Homer, N. Y.

A composition for treating vehicle floor coverings,consisting of " water, glue, alum, starch, asphaltum lead and whiting," mixed and suitably colored.

485,927.—Process of melting iron. Henry J. Graf, St. Louis, Mo.

485,940.—Apparatus for bleaching fruit. Elias Ireland, Winters, Cal.

485,942.—Bottle filling apparatus. John Jackson, Lonsdale, R. I.

485,953.—Siphonic water distributing apparatus. John K. Leedy, Tom's Brook, Va.

485,962.—Ore separator. Carl A. E. Meinick, Clausthal, Germany.

485,966.—Furnace. George T. Moe, Philadelphia, Pa.

485,972.—Ore concentrator. Thomas T. McNary, Hailey, Idaho.

485,986.—Malting apparatus. Jules Saladin, Nancy, France.

485,992.—Measuring vessel. John Snorf, Fairland, Mich.

485,999.—Process of and apparatus for ageing liquors. Theodore R. Timby, Washington, D. C.

The process consists in "subjecting the liquors in bulk to rapid mechanical vibration, producing a continuous tremulous action throughout the body of the liquor."

486,000.—Apparatus for ageing wines, spirits or other liquors. Theodore R. Timby, Washington, D. C.

486,015.—Crystallizing and setting box. Freeling W. Arvine, Port Richmond, N. Y.

486,026.—Hydrocarbon oil vaporizer and burner. George Botsford, New Haven, Conn.

(*Issued November 15, 1892.*)

486,070.—Calculating instrument. George M. Andrews, Boston, Mass.

486,094.—Secondary battery. Rudolf Eickemeyer, Yonkers, N. Y.

486,095.—Fluid motor. Charles F. Elmes, Chicago, Ill.

486,098.—Steam generator. Thomas Fearon, Yonkers, N. Y.

486,100.—Manufacture of coke. James J. Fronteiser and Charles S. Price, Johnstown, Pa.

486,110.—Blast furnace. Julian Kennedy, Pittsburg, Pa.

486,123.—Electric meter. John Perry, London, England.

486,127.—Apparatus for making lampblack. Swain Salbug, Ridgway, Pa.

486,130.—Digesting apparatus. Alex. Selkirk, Albany, N. Y.

486,133.—Boiler tube cleaner. William B. Smith and James R. Smith, Birmingham, Ala.

486,134.—Hot air furnace. James E. Spencer and Joseph L. Spencer, Des Moines, Iowa.

486,150.—Apparatus for cooling and washing gas. Charles H. Wilder, Boston, Mass.

486,165.—Composition of matter for producing Portland cement. Henry J. Livingston, New Orleans, La.

Consists of shell containing 90% and upward of lime, alluvial clay, and ground chalk flints.

486,167.—Smoke consuming steam boiler furnace. Frank Reynolds, Omaha, Neb.

486,172.—Method of disinfecting sewage. Hugo Wollheim, London, England.

The sewage is treated with a prepared mixture of milk of lime and trimethylamine.

486,188.—Bleaching compound. Hamilton Y. Castner, London, England.

Composed of sodium peroxide and one or more neutral salts of the alkaline earth metals.

486,196.—Lubricant. Charles H. Ridsdale, Guisborough, and Alfred Jones, Middleborough, England.

Consists of a "combination of an alkaline earth and fatty matter, consisting largely of stearine, ordinary soap, and sulphur."

486,224.—Carburetor. Nicholas Finck, Elizabeth, N. J.

486,225.—Apparatus for impregnating liquids with carbonic acid. Charles H. Frings, New York, N. Y.

486,232.—Ore concentrator. Pedro de Napoles, San Francisco, Cal.

486,246.—Percolator. John W. Evans, Cleveland, Ohio.

486,247.—Smoke purifier. Conrad Fink, St. Louis, Mo.

486,264.—Electric battery. John J. O'Lalor, Boston, Mass.

486,267.—Soap compound. Jonathan Sharr, Philadelphia, Pa.

Consists of "soap bark, water, crude turpentine, soda, sal-ammoniac, borax, camphor, oil and caustic soda." Used for treating wool for carding and spinning.

486,329.—Plaster compound. Henry R. English, Jackson, Mo.

Consists of "kaolin, silicate of soda, glue and sand."

486,330.—Process of treating speiss. Paul Flury, El Paso, Tex.

486,339.—Process of treating fibrous material for making pulp. James Johnston, Peter Culter and George Johnston, Denny, Scotland.

486,356.—Artificial block for pavements. David P. Sanders, Williamsport, Pa.

486,363.—Chinolinchinophenol sulphate and method of obtaining same. Joseph Ziegler, Bubrich, Germany.

A sulphur-yellow powder possessing a slight odor of chinolin, very readily soluble in water, forming a thick mass at 96° C., fusible at 114° C., and produced from orthoxychinolin by heating a mixture of one of said substances and a sulphate of the other.

486,390.—Centrifugal cream tester. Peter V. P. Berg, Askor-Vejen Station, Denmark.

486,406.—Process of removing sulphurous compounds from oils. John B. Huston, Cleveland, Ohio.

486,411.—Method of increasing the efficiency of motor fluids. William L. Saunders, Plainfield, N. J.

486,413.—Water filter. Henry A. Siegrist and George M. Bithman, St. Louis, Mo.

(*Issued November 22, 1892.*)

486,442.—Carburetor. John A. Enos, Boston, Mass.

486,443 to **486,450.**—Manufacture of artificial stone or cement. Plastic cements, of which magnesium oxide and magnesium chloride are the chief feature.

486,484.—Keg or barrel tilter. Walter I. Leggett, Galesburg, Ill.

486,485.—Pressure regulator. Joseph Lehe and Joseph Bodam, Rochester, N. Y.

486,491.—Gas producer. Alexander K. Murray, Bedford, Pa.

486,495.—Method of and apparatus for separating graphite or like substances from crushed rock. Axel W. Nibelius, Hackettstown, N. J.

486,496.—Process of turning iron and steel plates. Edwin Norton, Maywood, Ill.

486,512.—Incinerating furnace. Oscar Stevens, Clear Lake, Iowa.

486,535.—Construction of tanks, reservoirs, silos, etc. Pierre A. J. Monier, Plaine St. Denis, France.

486,540.—Gas furnace. Frederick Siemens, Dresden, Germany.

486,548.—Soda water apparatus. Jonathan Ramsey and Roswell Carleton, Boston, Mass.

486,550.—Odor removing device for cooking stoves. Charles T. Toliver and Powhattan Ruffin, Boston, Mass.

486,554.—Condenser. Henry S. Blackmore, Mount Vernon, N. Y.

486,557.—Brick kiln. Charles B. Coxe, Brooklyn, N. Y.

486,575.—Process of electrically reducing refractory compounds. Thomas L. Wilson, Leaksville, N. C.

The pulverized metallic compound is impregnated with a reducing agent (tar) by saturating it therewith while the latter is in a liquid condition, drying to expel volatile constituents, and then subjecting the tar impregnated compound to the smelting action of an electric current.

486,582.—Smoke consuming device. Emil Kunzer, Chicago, Ill.

486,590.—Process of producing inlaid work on stones. Rudolf Rausch, Vienna, Austria-Hungary.

486,594.—Method of treating minerals, mattes, speiss or other substances containing nickel. Jean De Coppet, Paris, France.

486,595.—Method of treating minerals, mattes, speiss or other substances containing nickel. Jean De Coppet, Paris, France.

486,607.—Method of and means for making patterns for individual lasts. George W. Willey, Brockton, Mass.

486,613.—Process of refining gold and silver matter. Werner Langguth, Deadwood, S. D.

486,622.—Concentrator. James Tulloch, Angels, Cal.

486,629.—Means for coloring paper. William N. Cornell, Brownsville, N. Y.

486,635.—Apparatus for manufacturing tin plate. Daniel Edwards, Morristown, England.

486,638.—Machine for surface coating paper. Chas. M. Gage, Pepperell, Mass.

486,647.—Process of obtaining ammonia or other salts from molasses. Lothar Sternberg, Jersey City, N. J.

486,689.—Electrical measuring instrument. Edward Weston, Newark, N. J.

486,690. } Apparatus for storing, handling and transporting liquids.
486,691. } August Cirkel, Boyd, Wis.

486,698.—Process of and apparatus for treating ores of gold. Louis C Daumas, Paris, France.

486,706.—Artificial Portland cement. Carl von Forell, Brunswick, Germany.

486,714.—Apparatus for casting pig iron. Henry I. Hibbard, Pittsburg, Pa.

486,727.—Thermostatic regulator. Edwin C. Merrill, Allegheny, Pa.

486,744.—Process of saturating articles or substances. John A. Titzel, Glenshaw, Pa.

486,760.—Oil can and siphon pump. Theodore Bumann, Bunker Hill, Ill.

486,761.—Method of burning clay to make ballast. Henry G. and William Butler, Kenosha, Wis.

486,770.—Process of making salicylate of phenyl. Paul Ernest, Ludwigshafen, Germany.

486,781.—Smoke consumer. Julius L. Hornig, St. Louis, Mo.

486,806.—Drier. Birney C. Batcheller, New York, N. Y.

(*Issued November 29, 1892.*)

486,854.—Boiler furnace and smoke consumer. James Connelly, Des Moines, Iowa.

486,859.—Water filter. Joseph Davis, San Francisco, Cal.

486,860.—Water filter. Joseph Davis, San Francisco, Cal.

486,870.—Composition for wall coverings. La Roy F. Griffin, North Granville, N. Y.

486,873.—Colors for printing on textile fabrics. Adolf Hoz, Linden, Germany.

486,876.—Centrifugal extractor. William E. Johnson, New York, N. Y.

486,879.—Magnetic separator. Thomas J. Lovett, Chicago, Ill.

486,927.—Washer or scrubber for gas. Josiah C. Chandler, London, England.

486,937.—Pulverizer or mixer. Robert W. Lyle, New York, N. Y.

486,941.—Process of reducing ores. Auguste J. Rossi, New York, N. Y.

"Process of fluxing titaniferous iron ore, which consists in combining their titanic acid with bases and fixed alkalies as fluxes, so as to form in the slag predominant titanates of those bases and subjecting the combination to the usual heat and treatment of a blast furnace."

486,966.—Fire kindler. Sigmund Elsinger, Savannah, Ga.

486,972.—Continuous brick piler. Carl H. Kaul, Madison, Neb.

486,983.—Process of utilizing heat in the manufacture of sugar and salt. Samuel M. Lillie, Philadelphia, Pa.

486,991.—Safety gas burner. Bayard E. Taylor, Chicago, Ill.

486,992. Disk water meter. James A. Tilden, Hyde Park, Mass.

486,998.—Fluid fuel feeder. Ezra T. Williams, Chicago, Ill.

487,013.—Method of securing designs on glass articles. Albert A. Grasser, Pittsburg, Pa.

The design or photograph is transferred with vitrifiable colors to the lower surface of the glass article, a suitable opaque enamel applied to cover the design, and the whole burned at a suitable heat.

487,027.—Still. Julius C. Dittrich and Frederick M. Grumbacher, New York, N. Y.

487,046.—Electric light carbon. James Glegg, London, England.

Metallic matter is deposited upon the carbon filaments by electrically heating the filaments to incandescence "while they are suspended in a vessel from which all air or oxidizing vapor is excluded above a volatile liquid, such as alcohol, having dissolved or suspended in it a haloid or acid salt or an oxide of some one or more suitable metals."

487,055.—Centrifugal butter extractor. Olaf Ohlson, Newark, N. J.

487,067.—Membranoid. James W. Deckert, Newark, N. J.

487,073. }
487,074. } Magnetic separators. Thomas J. Lovett, Chicago, Ill.

487,080.—Explosive powder. Jean V. Skoglund, Stockholm, Sweden.

"Dried grains of nitrated cellulose, gelatinized by means of a solvent containing a fat or fatty acid."

487,088.—Liquid ejecting device for bottles, etc. Franklin S. Cooley, Philadelphia, Pa.

487,089.—Process of treating liquids with ozone. Julius C. Dittrich and Frederick M. Grumbacher, New York, N. Y.

487,091.—Package for bleaching and packing rosin. David W. Ketsham, Evanston, Ill.

487,100.—Process of and device for reducing volatilized metals. Charles E. Seymour, Hurley, Wis.

487,119.—Refining Canadian or similar petroleum oils. Herman Fischer, London, Canada.

487,121.—Lithographic plate. Franklin F. Haggenmuller, New York, N. Y.

487,147.—Lamp for burning hydrocarbon or other oils. Samuel A. Johnson, London, England.

487,156.—Brick kiln. Louis H. Reppell, Kansas City, Mo.

487,167.—Eugenol benzyl-ether and process for preparing same. Fritz Ach, Mannheim, Germany.

The process consists in "dissolving eugenol in rectified spirits, adding thereto alkaline hydrates and a halogen compound of benzyl, heating the mixture, and then distilling off the spirits and adding water to precipitate eugenol benzyl-ether and finally purifying the eugenol benzyl-ether." A colorless oil solidifying in thick prisms which melt at 29 to 30 per cent.

487,173.—Fumigator. Robert Campbell, Lostock, near Northwitch, England.

487,174.—Brick kiln. Joseph Conley and James M. Wolfe, Tarkis, Mo.

487,176.—Process of electro-depositing alloys. Sherard O. Cowper-Coles, London, England.

An alloy of silver and any known metal or metals other than the rare metals having a specific gravity between 6.5 and 9.0 at 15° C., and boiling between 710° and 1045° C., is deposited electrolytically on metals or other suitable articles by placing the latter "in a bath of the double cyanides of such metal or metals and silver and potassium, and an anode is employed consisting of an alloy of the metals to be deposited in approximately the proportions of the deposit."

487,188.—Process of extracting metals from refractory ores. Henry R. Lewis, London, and Charles B. Phillips, Chester, England.

487,195.—Steam generator. Thomas McBride, Philadelphia, Pa., and Ebenezer Fisher, Kincardine, Canada.

487,203.—Anti-friction lubricating compound. John B. Wallace and John W. Stevens, Gallion, Ohio.

487,204.—Process of preparing vanillin. Fritz Ach, Mannheim, Germany.

By "dissolving eugenol in alcohol, adding thereto alkaline hydrate and a halogen compound of benzyl, and heating the mixture. Second, dissolving the resulting eugenol benzylether in alcohol, adding thereto alkaline hydrate, keeping the same at the boiling point for some time, then partially distilling off the alcohol and adding water to the residue. Third, adding to the resulting isoeugenol benzyl ether a mixture of sodium chromate, sulphuric acid and water, and, finally, adding hydrochloric acid to the resulting vanillin benzyl ether."

It crystallizes in fine needles or transparent plates which melt at 63° to 64° C.

487,205.—Isoeugenol benzyl ether and process of preparing the same. Fritz Ach, Mannheim, Germany.

Eugenol benzyl ether is dissolved in alcohol, alkali hydrate added thereto, the mixture kept at the boiling point for some time, after which the alcohol is partly distilled off, water added to the residue and the resulting isoeugenol benzyl ether (a yellowish brown crystalline mass) purified by pressing and recrystallizing from alcohol. It crystallizes in felted needles and having a melting point of 58 to 59° C.

487,216.—Purifying petroleum. Herman Frasch, Cleveland, Ohio.

(Issued December 6, 1892.)

487,244.—Embalming apparatus. Herbert J. Breeze, Olean, N. Y.

487,248.—Ore separator and concentrator. George Carson, Council Bluffs, Iowa.

487,261.—Ore concentrating machine. Andrew Frazer, San Francisco Cal.

487,285.—Electrical heater. Willis Mitchell, Malden, Mass.

487,286.—Glass tank furnace. William F. Modes, Streator, Ill.

487,300.—Steam generator. Wright D. Smith, Detroit, Mich.

487,310.—Method of heating by metal bath. Frederick L. White, Milwaukee, Wis.

487,316.—Centrifugal butter extractor. Gustav M. Andersson, Newark, N. J.

487,317.—Means for superheating steam. Alexander Beatobuloff, Bielaia Turkov, Russia.

487,323.—Apparatus for separating molasses from sugar. Emmett A. Ellis, Sartartia, Tex.

487,324.—Galvanic battery. James L. Gethino, Boston, Mass.

487,338.—Method of mixing alloys. William R. Thomas, Catasauqua, Pa.

487,339.—Ice shaving machine. George B. Webb, Kinston, N. C.

487,342.—Process of carbonating fermented beverages. Jacob F. Wittermann, Yonkers, N. Y.

487,349.—Machine for plucking hairs from skins. Frank J. Murphy, Danbury, Conn.

487,370.—Ice cream freezer. Henry Mayers, San Francisco, Cal.

487,384.—Automatic faucet. Aaron A. Belleau, Brooklyn, N. Y.

487,390.—Ozone tube. Oscar Frohlist, Berlin, Germany.

487,405.—Beer cooler. John F. Duffy, Brooklyn, N. Y.

487,421.—Oil filter. Oscar Lindberg, Helsinborg, Sweden.

487,425.—Method of preparing glass metal. Roger S. Pease, Rose, Minn.

487,426.—Apparatus for moulding glass metal, etc. Roger S. Pease, Rose, Minn.

487,431.—Bakers' oven. George R. Skillmann, Baltimore, Md.

487,439.—Process of manufacturing sugar. Edward C. Barthelemy, New Orleans, La.

487,444.—Process of smelting ores containing zinc. Henry A. Hunicke, St. Louis. Mo.

487,467.—Filtering system. Robert Beyrle, Los Angeles, Cal.

487,478.—Mercurial air pump. Gustav A. Frei, Springfield, Mass.

487,507.—Apparatus for mixing flour or other materials. John D. Bangert, Baltimore, Md.

487,511.—Ore rake. John C. Blau, Wilmington, Del.

487,519.—Thermostat. Franklin O. Elliott, Catawaba, N. C.

487,521.—Automatic damper for furnaces, etc. David W. Glendenning, Denver, Col.

487,523.—Ore concentrator. Alfred Gonzalez, San Francisco, Cal.

487,531.—Barrel filler. Karl Kiefer, Cincinnati, Ohio.

487,542.—Device for operating ore concentrators and allied machines. Charles E. Seymour, Lake Geneva, Wis.

487,549.—Feed water heater. William J. Austin, Fond du Lac, Wis.

487,579.—Process of treating gold and silver ores. George W. McGee, Chicago, Ill.

The crushed ore is submerged in a solution of caustic soda or potash, after which salts of oxalic acid are added and the liquid evaporated.

487,588.—Disinfecting apparatus. Emil Taussig and Salomon Taussig, New York, N. Y.

487,605.—Combined furnace for treating and reducing ores and for refining the resulting metals. Antoine Chabaud, L. Leopold Van Heers and Louis A. Allard, St. Louis, Mo.

487,606.—Coating surfaces with plastic material. Melvin B. Church, Grand Rapids, Mich.

487,607.—Method of arc and incandescent metal heating. Charles L. Coffin, Detroit, Mich.

487,614.—Filter. Warren R. Evans, Portland, Me.

487,616.—Apparatus for manufacturing gas. James Gray, Lima, Ohio.

487,617.—Process of carbureting air. Arthur B. Griffen, Newark ,and William C. Clarke, Bloomfield, N. J.

487,638.—Baking oven. Paul Pfeiderer, London, England, and Herrmann Werner, Cannstatt, Germany.

487,639.—Process of elevating liquids. Julius G. Pohlé, Jersey City, N. J.

487,644.—Process of and apparatus for generating electricity. J. S. Rogers, New York, N. Y.

The process consists in "exposing a fusible electrolyte capable of being deoxidized and reoxidized while in a state of fusion in the presence of suitable electrodes to a current of a deoxidizing gas injected in one direction and to a current of an oxidizing gas injected in the opposite direction."

(*Issued December 13, 1892.*)

487,706.—Refrigerating machine. Louis Block, New York, N. Y.

487,713.—Thermostatic vessel. Henry Carmichael, Malden, Mass.

487,724.—Feed water heater and purifier. Jules J. J. DeRycke, Brooklyn, N. Y.

487,729.—Caustic soda distributer. William S. Fickett, Rochester, N. Y.

487,763.—Cleaning tin plate or metallic sheets. Edwin Norton, Maywood, Ill.

487,782.—Process of disintegrating vegetable substances. Alexander Selkirk, Albany, N. Y.

487,783.
487,784. } Digesting apparatus. Alex. Selkirk, Albany, N. Y.

487,790.—Beer filling apparatus. Heinrich Stockheim, Mannheim, Germany.

487,792.—Steam generator. Thomas L. Sturtevant and Thomas J. Sturtevant, Framingham, Mass.

487,803.—Apparatus for rolling plate glass. Edward Walsh, Jr., St. Louis, Mo.

487,817.—Means for regulating the flow of liquids from vessels. Frederick E. Baldwin, New York, N. Y.

487,823.—Smoke consuming furnace. George L. Cross, Springfield, Mass.

487,827.—Process of drying brick. Charles J. Dion, St. Paul, Minn.

487,834.—Manufacture of secondary battery electrodes. William W. Griscom, Haverford, Pa.

487,837.—Process of and apparatus for making essences. Hector Huvelle, Weatherford, Tex.

487,839.—Galvanic battery. Harry T. Johnson, New York, N. Y.

487,866.—Faucet. Karl Kiefer, Cincinnati, Ohio.

487,887.—Apparatus for making bisulphite of lime. William H. Howell, Thorold, Canada.

487,898.—Pyrotechnic device. George J. M. Ashby, Coney Island, N. Y.

487,899.—Pyrotechnic device. George J. M. Ashby, Coney Island, N. Y.

487,907.—Gas meter. Henry A. Tobey, Toledo, Ohio.

487,908.—Gas meter register. Henry A. Tobey, Toledo, Ohio.

487,912.—Process of and apparatus for disintegrating fibrous substances. John B. Carter and Jesse H. Berst, Kokomo, Ind.

487,913.—Fibre-disintegrating machine. John B. Carter and Jesse H. Berst, Kokomo, Ind.

487,928.—Production of adhesives. Ludwig Kerr, Hamburg, Germany.

487,943.—Centrifugal liquid separator. Henry F. Beimling, Philadelphia, Pa.

487,971.—Apparatus for condensing fumes. Albert F. Schneider, St. Louis, Mo.

487,979.—Disinfecting device. John W. Bowerbank, Jersey City, N. J.

487,999.—Bottle washer and rinser. Otto Eick, Philadelphia, Pa.

488,024.—Wall finish and method of making same. Benjamin Moore, Brooklyn, N. Y.

488,025.—Machine for dyeing and fluxing metal sheets. Edwin Morton and John G. Hodgson, Maywood, Ill.

488,049.—Brick press. George H. Babcock, Plainfield, N. J.

488,064.—Magnetic separator. Harvey S. Chase, Boston, Mass.

488,067.—Pulp screening machine. Charles J. Foster, Westbrook, Me.

488,082.—Automatic cut-off for gas burners. Francis W. Merchant, London, Canada.

488,104.—Apparatus for aging and purifying liquors. Amos L. Wood, Boston, Mass.

488,106.—Brick machine. Sylvester B. Babcock, Adrian, Mich.

488,108.—Oil burner. Jacob Barrow, Windfall, Ind.

488,114.—Machinery for rolling glass. Edward F. Chance. West Smithwick, England.

488,122.—Illuminating tile. Jacob Jacobs, Brooklyn, N. Y.

488,141.—Process of insulating electric conductors. Charles Cuttriss, New York, N. Y.

488,144.—Beer cooler. Wyatt Gibson, Dodd, Tex.

488,151.—Sheet metal plate for tinning and the art of its manufacture. Edwin Morton, Maywood, Ill.

488,166.—Pulp screen. John J. Flanders, Portland, Me.

488,168.—Furnace for burning garbage. John C. Kessler, Milwaukee, Wis.

488,169.—Garbage crematory. John C. Kessler, Milwaukee, Wis.

(Issued December 20, 1892.)

488,207.—Process of and apparatus for making ammonia. Paul Kuntze, Aschersleben, Germany.

The "process of making ammonia and tar which consists in drying and calcining nitrogenous material—such as peat—to drive off separately the aqueous and tarry vapor, passing the tarry vapors through incandescent material, thereby forming tar ammonia and combustible gas, the said incandescent material being heated by the said combustible gas; and simultaneously treating the calcined material with heated air and the said aqueous vapor to form ammonia and heating gases, the said heating gases being utilized for heating the said air and calcining the said nitrogenous material."

488,208.—Apparatus for generating gas. Oscar Langberg, Brooklyn, N. Y.

488,211.—Coal separator. Eugene F. Long, Scranton, Pa.

488,216.—Apparatus for dyeing. Rudolph Nicklis, Lorraine, France.

488,223.—Fire kindler. Silas M. N. Rogers, Bell's, Tex.

488,233.—Storage battery. George A. Washburn, Cleveland, Ohio.

488,245.—Method of and apparatus for treating the smoke and fumes of metallurgical furnaces. William M. James, Denver, Col.

488,264.—Oil filter. Joseph Deuss, Gladbach, Germany.

488,280.—Micrometer gauge. Joseph P. Lavigne, New Haven, Conn.

488,281.—Micrometer gauge. Joseph P. Lavigne, New Haven, Conn.

488,290.—Process of making oxyuvitic acid. Bruno R. Seifert, Radebad, Germany.

488,317.—Filtering material. Ferdinand Lascar, New York, N. Y.

Consists of jute impregnated with tannate of iron.

488,338.—Process of embalming. Taylor Martin, Fairmont, W. Va.

488,343.—Brick or tile cutter. A. Z. Williams, Chicago, Ill.

488,355.—Oil burner. Alfred E. Harper, Chicago, Ill.

488,374.—Process of making white lead. Elwyn Waller and Charles A. Sniffin, New York, N. Y.

The process "consists in subjecting a solution of basic lead acetate with water impregnated with carbon dioxide, while said mixture is in mass and under a pressure above the atmospheric pressure, to the action of carbon dioxide gas, and agitating the mixture during the admixture of the gas therewith, said pressure being maintained during precipitation of lead from the solution in the form of lead hydrocarbonate."

488,399.—Wood pulp drainer. George M. Newhall and Charles L. Hamilton, Philadelphia, Pa.

488,403.—Machine for cleaning malt. Ernst Richter, New York, N. Y.

488,413.—Pottery kiln. Werner H. Zimmer and Otto G. Hess, Wheeling, W. Va.

488,414.—Apparatus for heating tar. Joseph H. G. Zunner, Boston, Mass.

488,416.—Composition for removing paint or varnish from wood. George L. Ball, Allegheny, Pa.

A mixture of benzole, fusel oil andalcohol.

488,430.—Basic yellow dye. Jacob Gnehm and Jakob Schrind, Basle, Switzerland.

Dyestuff obtained from dimethyldiamidodiorthotolylmethane. A yellow powder, readily soluble in water and in alcohol, insoluble in benzine, and yielding a violet red solution when treated with acetic acid, zinc dust and hydrochloric acid.

488,433.—Compound for tempering steel. Hiland E. Hopkins, Barton, Vt.

"A liquid composition for tempering metals, consisting of twenty grains of potassium bromide to one gallon of crude lubricating oil and double the quantity of soft water."

488,470.—Process of reducing franklinite ores. George G. Corners, Salisbury, Pa.

Process of "treating ores containing franklinite, willemite and zincite, which consists in treating the franklinite to render it magnetic, separating it by magnets from the willemite and zincite, reducing the willemite and zincite to spelter by a Belgian or other suitable furnace, treating the franklinite in the Wetherill or other suitable furnace for the manufacture of oxide of zinc and smelting the residuum from the franklinite for spiegeleisen."

488,471—Process of treating franklinite and willemite. George G. Corners, Salisbury, Pa.

Similar to the above.

488,479.—Anti-fouling paint. Anson L. Munson, East Oakland, Cal.

An anti-fouling paint containing a pigment, mercurous chloride, and a vehicle consisting of coal tar, chloride of zinc and oil of turpentine.

488,517.—Apparatus for moulding pulp. Stanley L. Chapman, Evanston, Ill.

488,519.—Self purifying superheating steam generator. Benjamin F. Field, Chicago, Ill.

488,524.—Feed water heater and purifier. James MacDonald, Los Angeles, Cal.

488,527.—Process of coating sheet metal. Edwin Norton, Maywood, Ill.

488,528.—Concentrator. William P. Ogden, Denver, Col.

(*Issued December 27, 1892.*)

488,534.—Explosive. John F. Alexander, Washington, D. C.

A powder composed of "naphthaline, or suitable solid hydrocarbon, and sulphur, a potassium salt or salts, picrate of ammonium, and sulphate of ammonium in variable proportions."

488,580.—Apparatus for making alumina. Henry W. Shepard, Camden, N. J.

488,583.—Apparatus for separating solid matter from liquids. Gustave Sobotka, New York, and William Ahrens, Long Island City, N. Y.

488,611.—Thermostatic indicator and adjuster. Emil C. C. Krogh, Monmouth, Ill.

488,621.—Filter. Simeon L. West, Washington, D. C.

488,622.—Brick machine. Bruce C. White, Chicago, Ill.

488,628.—Method or process of treating sludge. Hans A. Frasch, Cleveland, Ohio.

488,645.—Push bottom and thermostat. Edward L. Ashley and Wallace H. Camp, Waterbury, Conn.

488,646.—Injector burner. Amos L. Avery, Bradford, Pa.

488,660.—Oil burner. William F. Otis, Norwalk, Ohio.

488,661.—Melting furnace. William Rebmann, Chicago, Ill.

488,664.—Condensing apparatus. Matthias J. Reuber and Edwin G. Stone, Pittsburg, and Peter Fuchs, Lower St. Clair, Pa.

488,672.—Centrifugal liquid separator. Jesse E. Folk, Brooklyn, N. Y.

488,673.—Water purifier. Madden J. Hewlett and De John C. Cecil, Paducah, Ky.

488,682.—Artificial stone. Anton Sladoslawek, Chicago, Ill.

488,683.—Producing enameled iron ware. Carl A. W. Vollrath, Sheboygan, Wis.

A process for "producing speckled enameled iron ware, which consists in mixing two enamels having different fusibility and ground to different degrees of coarseness, applying them to the article, drying and fusing."

488,702.—Apparatus for washing sodium bicarbonate. Karl J. Sundstrom, Brooklyn, N. Y.

488,708.—Electrolytic apparatus. Thomas Craney, Bay City, Mich.

488,709.—Water heater. John Dawson, Huddersfield, England.

488,726.—Secondary battery. Nicholas Waldimiroff, St. Petersburg, Russia.

488,766.—Alembic. Victor J. Kuiss, Paris, France.

488,767.—Destructive distillation of mineral oils. John Laing, Edinburgh, Scotland.

488,770.—Grain drier. William McKee, Chicago, Ill.

488,796.—Process of utilizing tin scrap. Harold B. Nye, Cleveland, Ohio.

The tin scraps are melted "into an alloy with pig or other iron, and removing the tin and other metals and impurities alloyed with the iron by oxidation by forcing blasts of air under pressure into intimate contact with all parts of the molten alloy."

488,798.—Air cooling and purifying apparatus. George E. Proctor, Washington, D. C.

488,801.—Coffee substitute and method of preparing same. Heinrich Trillich, Munich, Germany.

The process consists in "soaking malt, then roasting the same, then spraying the same; the result is a liquor containing the aromatic essence of coffee and sugar: the further heating the same until the shell or husk of the malt becomes covered with a saccharine coating, and finally, covering the grains with a film of fat and rapidly cooling the same." Hence, grains of malt impregnated with the aromatic essences of coffee to the exclusion of caffeine.

488,813.—Feed water purifier. William B. Hosford, Mishawaka, Ind.

488,824.—Generator. William B. Macdonald, Allegheny, Pa.

488,859.—Apparatus for filling and stopping bottles. Dennis Wickham, Ware, England.

488,867.—Crushing roll. Daniel Brennan, Jr., Bayonne, N. J.

488,881.—Carbureter. William Falley and James Falley, Lafayette, Ind.

488,883.—Brick cutting machine. Charles T. Fitch and Andrew, Schautz, Perth Amboy, N. J.

488,898.—Process of testing materials containing metals. Robert F. Neuninger, Newark, N. J.

488,953.—Incubator. Henry M. Scheer, Quincy, Del.

488,956.—Apparatus for separating solid matter from liquids. Gustave Sobotka, New York, and William Ahrens, Long Island City, N. Y.

488,967.—Process of and apparatus for vulcanizing wood. Samuel E. Haskin, Aroca, N. Y.

Heated compressed air is circulated through the vulcanizing chamber and then, without interrupting the circulation or relaxing the pressure, successive volumes of cold air are introduced into the circulating system until the wood is cooled down below the boiling point of its liquid or liquifiable constituents.

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GERMANY. Archiv der Pharmacie.
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Sitzungseberichte der K.B . Akademie der Wissenschaften zu München.

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Chemisch Technischer Central Anzeiger.
Drogisten Zeitung.
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Endlich's Manual of Qualitative Blowpipe Analysis.
Chemical Bulletins of the U. S. Agricultural Department.
The Life and Work of the late Prof. Warren. From Prof. F. H. Storer

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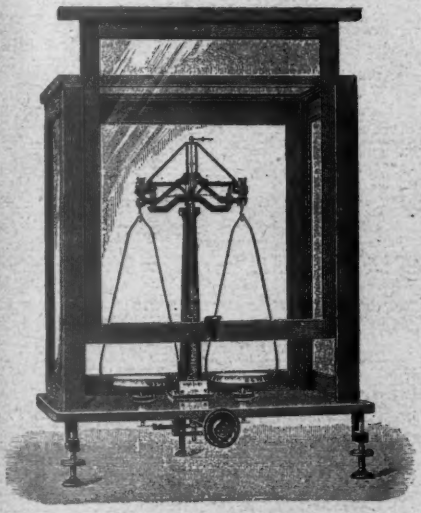

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